

REMARKS

Claims 1-58 are pending in the application. Claims 1-7, 10, 11, 13, 21, 24-31, 34, 35, 37, 45, 48-50 and 54-57 are rejected and the Patent Office has objected to Claims 8, 9, 12, 14-20, 22, 23, 32, 33, 36, 38-44, 46, 47, 53 and 58. In response, Claims 1, 25, 49, 54 and 58 are amended, no claims are cancelled no claims are added. Applicants respectfully request reconsideration of pending Claims 1-58 in view of at least the following remarks and withdrawal of the rejections of record is requested in view of such amendments and the following discussion.

I. Claims Objections

The Patent Office objected to Claim 58 for a formality. Applicant has amended Claim 58 in accordance with the Patent Office's request. Hence, Applicant respectfully requests that the Patent Office withdraw the objection to Claim 58.

II. Claims Rejected Under 35 U.S.C. §103

The Patent Office rejected Claims 1-7, 21, 24-31, 45, 48-50, 54 and 55 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent Application No. 2003/0128207 to Sawada ("Sawada") and U.S. Patent Application No. 2003/011596 to Zhang et al. ("Zhang"). Applicant respectfully traverses this rejection.

Regarding Claims 1 and 25, Claims 1 and 25 recite the following claim feature, which is neither disclosed nor suggested by the combination of Sawada in view of Zhang:

computing the color value for the point P using an importance sampling estimator for a reflected radiance integral, where the importance sampling estimator selects a plurality of ray samples for evaluation of the reflected radiance integral at the point P to generate the color value, where ray sample directions are chosen according to information obtained from at least a light source term and a bi-directional reflectance distribution function (BRDF) term of the reflected radiance integral. (Emphasis added.)

According to the Patent Office, the computing of the color value for the point using an importance sampling estimator for a reflected radiance integral is disclosed at ¶¶0050-0057 on pg. 4 of Sawada. Applicant respectfully disagrees with the Patent Office.

Sawada describes a system for scanning a physical object's surface reflectance property such as diffuse and specular color. Assuming that an object's geometry is known (obtained, e.g.,

via a laser scanner), the system places the object on a turntable, illuminates it with a known light source, and images it from a fixed position. (See, FIG. 12 and ¶¶0050-0057 on pg. 4.) From the observed data, the system recovers specular and diffuse colors – specifically parameters for a Phong reflectance model. (See, FIG. 4 and ¶0055 on pg. 4.)

In contrast to the above-recited feature of Claims 1 and 25, Sawada does not describe how to compute color for a point using an important sampling estimator to select a plurality of ray samples for evaluation of the reflected radiance integral at the point P to generate the color value. In Sawada, while the reflected radiance integral is used (see, ¶0057), the value of the integral is known (it is what is observed from the camera) (see, FIG. 12) and the goal is to recover the BRDF term integrand ($\text{BRDF}(l_c + r, \theta_o)$) of the integrand. Specifically, as disclosed by Sawada:

This is achieved by calculating the direction of the center of the light source at each coloring portion, the direction of observation, and the position on the image, from the positional information of the photography device 1, subject 3, and area light source 2 at the time of photography, and properties or settings information for the photography device 1 and area light source 2, and obtaining a BRDF' (l_c, θ_o) which is an apparent BRDF which does not take into consideration the fact that the light source is an area light source for the lightness on the image. (¶0053, lines 4-14.) (Emphasis added.)

As further described at step 3 of the flowchart of FIG. 4, tasks are carried out for estimating the real BRDF, which refers to the BRDF term within the integrand ($\text{BRDF}(l_c + r, \theta_o)$) of the elimination luminance distribution, as described at ¶0057 of Sawada. Accordingly, color, as disclosed by Sawada, refers to a parameter of the surface BRDF. As a result, Sawada does not mention the importance sampling or any related topics due to the fact that sampling makes no sense in the context of Sawada because importance sampling is a method for integrating a function to generate a color value, while Sawada is trying to recover the function ($\text{BRDF}(l_c + r, \theta_o)$) given that its integrand ($\text{BRDF}'(\theta_i, \theta_o)$) is known. (See, ¶0055 of Sawada.)

As correctly noted by the Patent Office, Sawada fails to teach selecting ray samples. (See, pg. 2, ¶5 of the Office Action mailed September 20, 2005.) As a result, the Patent Office cites Zhang, which according to the Patent Office discloses such feature at ¶0063. However, after careful review of ¶0063 of Zhang, ¶0063 of Zhang is merely a description of the physics that underlie the Lambertian reflectance model. This is well known and has nothing to do with how to actually apply this model in the context of evaluating reflected radiance. Hence, Applicant respectfully submits that the combination of Sawada in view of Zhang fails to

disclose, teach or suggest an importance sampling estimator to select a plurality of ray samples for evaluation of a reflected radiance integral at the point P to generate a color value, as recited by Claims 1 and 25.

As mandated by case law, to establish *prima facie* obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). Here, Claims 1 and 25 relate to the computation of a color point using an importance sampling estimator, which is used to select a plurality of ray samples for evaluation of the reflected radiance integral at the point P to generate the color value.

Conversely, the disclosure in Sawada is directed to recovering a BRDF term (BRDF ($l_c + r, \theta_o$)) of an integrand when a value of the integrand (BRDF' ($\theta_i \theta_o$)) is known. (See, ¶¶0055 and 0057 of Sawada.) As a result, Sawada provides no teaching or suggestion regarding an importance sampling estimator, as recited by Claims 1 and 25. Applicant respectfully submits that the lack of any teaching or suggestion regarding importance sampling within Sawada is due to the fact that importance sampling makes no sense in the context of Sawada, since importance sampling is a method for integrating a function, which Sawada is trying to recover the function given that the integrand is known. (See, supra.)

Accordingly, Applicant respectfully submits that the Patent Office fails to establish *prima facie* obviousness of a claimed invention recited by Claims 1 and 25, since the combination of Zhang in view of Sawada fails to teach or suggest all claim limitations of Claims 1 and 25; specifically, the use of an important sampling estimator for selecting a plurality of ray samples for evaluation of a reflected radiance integral at a point P to generate a color value, as recited by Claims 1 and 25. Id. Therefore, Applicant respectfully submits that the Claims 1 and 25 are not obvious over the combination of Sawada in view of Zhang. Consequently, Applicant respectfully requests that the Patent Office reconsider and withdraw the §103(a) rejection of Claims 1 and 25.

Regarding Claims 2-7, 21 and 24, Claims 2-7, 21 and 24, based on their dependency from Claim 1 and for at least the reasons described above are also not obvious over the combination of Sawada in view of Zhang. Consequently, Applicant respectfully requests that the Patent Office reconsider and withdraw the §103(a) rejection of Claims 2-7, 21 and 24.

Regarding Claims 26-31, 45 and 48, Claims 26-31, 45 and 48, based on their dependency from Claim 25 and for at least the reasons described above are also not obvious over the

combination of Sawada in view of Zhang. Id. Consequently, Applicant respectfully requests that the Patent Office reconsider and withdraw the §103(a) rejection of Claims 26-31, 45 and 48.

Regarding Claim 49, Claim 49 recites the following claim feature, which is neither disclosed nor suggested by the combination of Sawada in view of Zhang:

shade logic to compute the color value of the point P using an importance sampling estimator for a reflected radiance integral to select a plurality ray samples for evaluation of the reflected radiance integral at the point P to generate the color value according to a light source term, a visibility term and a bi-directional reflectance distribution function (BRDF) term of the reflected radiance integral. (Emphasis added.)

With regard to analysis of the cited art teaching an apparatus including the shade logic as claimed, Applicant's arguments with regard to the §103(a) rejection of Claims 1 and 25 apply to the Patent Office's rejection of Claim 49 under 35 U.S.C. §103(a) as not obvious over the combination of Sawada in view of Zhang. Consequently, for at least the reasons described above, Applicant respectfully submits that the Patent Office fails to establish a *prima facie* case of obviousness of Claim 49, since the prior art combination of Sawada in view of Zhang fails to teach or suggest the use of an importance sampling estimator for selection of a plurality of ray samples for evaluation of the reflected radiance integral at the point P to generate the color value, as recited by Claim 49. Id.

Applicant respectfully submits that Claim 49, as amended, is not obvious over the combination of Sawada in view of Zhang. Id. Therefore, Applicant respectfully requests that the Patent Office reconsider and withdraw the §103(a) rejection of Claim 49.

Regarding Claim 50, Claim 50, based on its dependency from Claim 49, and for at least the reasons described above, is also not obvious over the combination of Sawada in view of Zhang. Consequently, Applicant respectfully requests that the Patent Office reconsider and withdraw the §103(a) rejection of Claim 50.

Regarding Claim 54, Claim 54 recites the following claim feature, which is neither disclosed nor suggested by the combination of Sawada in view of Zhang:

shading logic to compute the color value of the point P using an importance sampling estimator for a reflected radiance integral to select a plurality ray samples evaluation of the reflected radiance integral at the point P to generate the color value according to a light source term, a visibility term and a bi-directional reflectance distribution function (BRDF) term of the reflected radiance integral. (Emphasis added.)

With regard to an analysis of the cited art teaching or suggesting a system including shading logic as claimed, Applicant's arguments with regards to the §103(a) rejection of Claim 49 apply to the §103(a) rejection of Claim 54 as not obvious over the combination of Sawada in view of Zhang under 35 U.S.C. §103(a).

Consequently, for at least the reasons described above, Applicant respectfully submits that Claim 54 is not obvious over the combination of Sawada in view of Zhang since the prior art combination of Sawada in view of Zhang fails to teach or suggest all claim limitations recited by amended Claim 54, as required to establish a *prima facie* case of obviousness. *Id.* Therefore, Applicant respectfully requests that the Patent Office reconsider and withdraw the §103(a) rejection of Claim 54.

Regarding Claim 55, Claim 55, based on its dependency from Claim 54, is also not obvious over the combination of Sawada in view of Zhang. Consequently, Applicant respectfully requests that the Patent Office reconsider and withdraw the §103(a) rejection of Claim 55.

The Patent Office has rejected Claims 10, 11, 13, 34, 35, 37, 51, 52, 56 and 57 under 35 U.S.C. §103(a) as being unpatentable over Sawada in view of Zhang and further in view of U.S. Patent No. 6,697,062 issued to Cabral et al. ("Cabral"). Applicant respectfully traverses this rejection.

Regarding the Patent Office's citing of Cabral, Applicant respectfully submits that the Patent Office's citing of Cabral fails to rectify the deficiencies of the combination of Sawada in view of Zhang to either teach or suggest the use of an importance sampling estimator to select a plurality of ray samples for evaluation of a reflected radiance integral at a point P to generate a color value, as recited by independent Claims 1, 25, 49 and 54. Accordingly, Claims 1, 25, 49 and 54, for at least the reasons described above, are also not obvious over the combination of Sawada in view of Zhang and further in view of Cabral. *Id.*

Regarding Claims 8, 9, 12, 14-20, 22 and 23, Claims 8, 9, 12, 14-20, 22 and 23, based on their dependency from Claim 1, are also not obvious over the combination of Sawada in view of Zhang and further in view of Cabral. Consequently, Applicant respectfully requests that the Patent Office reconsider and withdraw the §103(a) rejection of Claims 8, 9, 12, 14-20, 22 and 23.

Regarding Claims 34, 35 and 37, Claims 34, 35 and 37, based on their dependency from Claim 25, are also not obvious over the combination of Sawada in view of Zhang and further in

view of Cabral. Consequently, Applicant respectfully requests that the Patent Office reconsider and withdraw the §103(a) rejection of Claims 34, 35 and 37.

Regarding Claims 51 and 52, Claims 51 and 52, based on their dependency from Claim 49, are also not obvious over the combination of Sawada in view of Zhang and further in view of Cabral. Consequently, Applicant respectfully requests that the Patent Office reconsider and withdraw the §103(a) rejection of Claims 51 and 52.

Regarding Claims 56 and 57, Claims 56 and 57, based on their dependency from Claim 54, are also not obvious over the combination of Sawada in view of Zhang and further in view of Cabral. Consequently, Applicant respectfully requests that the Patent Office reconsider and withdraw the §103(a) rejection of Claims 56 and 57.

III. Allowable Subject Matter

The Patent Office objected to Claims 8, 9, 12, 14-20, 22, 23, 32, 33, 36, 38-44, 47, 47, 53 and 58 as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form, including all of the limitations of the base claim and any intervening claims. Claims 8, 9, 12, 14-20, 22, 23, 32, 33, 36, 38-44, 47, 47, 53 and 58 are allowable based on their dependency from independent Claims 1, 25, 49 and 54, respectively. Accordingly, Applicant respectfully requests that the Patent Office allow Claims 8, 9, 12, 14-20, 22, 23, 32, 33, 36, 38-44, 47, 47, 53 and 58, based on their dependency from independent Claims 1, 25, 49 and 54, respectively.

CONCLUSION

In view of the foregoing, it is submitted that Claims 1-58 patentably define the subject invention over the cited references of record, and are in condition for allowance and such action is earnestly solicited at the earliest possible date. If the Patent Office believes a telephone conference would be useful in moving the case forward, he is encouraged to contact the undersigned at (310) 207-3800.

If necessary, the Commissioner is hereby authorized in this, concurrent and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2666 for any additional fees required under 37 C.F.R. §§1.16 or 1.17, particularly, extension of time fees.

Respectfully submitted,

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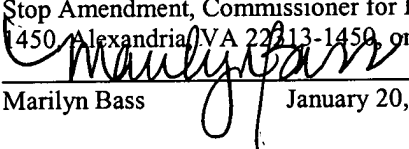
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Marilyn Bass

January 20, 2006